

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-212150

(43)Date of publication of application : 31.07.2002

(51)Int.Cl.

C07C211/54
C09K 11/06
H05B 33/14
H05B 33/22

(21)Application number : 2001-012995

(71)Applicant : CANON INC

(22)Date of filing : 22.01.2001

(72)Inventor : SENOO AKIHIRO

MASHITA SEIJI

UENO KAZUNORI

TANABE HIROSHI

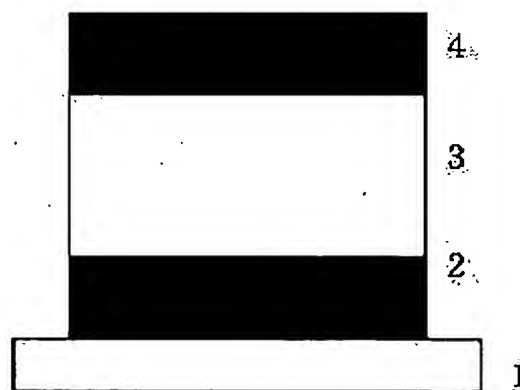
KAWAI TATSUTO

(54) TRIARYLAMINE COMPOUND, POLYMER FILM BY USING THE TRIARYLAMINE COMPOUND, ORGANIC LIGHT EMISSION ELEMENT AND METHOD FOR PRODUCING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an organic light emission element capable of providing a high-intensity optical output having a long life with extremely high efficiency.

SOLUTION: This organic light emission element has at least a pair of electrodes composed of an anode and a cathode, and layers comprising one or a plurality of organic compounds supported between the pair of the electrodes. At least one layer of the layers comprising the organic compound is composed of a polymer film containing a triarylamine compound having at least a plurality of polymerizable double bonds in the same molecule.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The thoria reel amine compound characterized by having two or more polymerization nature double bonds at least in the same intramolecular.

[Claim 2] The thoria reel amine compound according to claim 1 characterized by said polymerization nature double bond consisting of a double bond of carbon-carbon.

[Claim 3] The thoria reel amine compound according to claim 2 characterized by the double bond of said carbon-carbon consisting of an acrylic ester radical which is not permuted [the vinyl group which is not permuted / a permutation or /, a permutation, or].

[Claim 4] The thoria reel amine compound according to claim 1 to 3 characterized by having said at least three or more polymerization nature double bond radicals.

[Claim 5] Polymerization film characterized by containing a thoria reel amine compound according to claim 1 to 4.

[Claim 6] At least one layer of the layers which contain said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a couple which consists of an anode plate and cathode, and 1 or two or more organic compounds which were ****(ed) by inter-electrode [of this couple] is an organic light emitting device characterized by consisting of the polymerization film containing the thoria reel amine compound which has two or more polymerization nature double bonds at least in the same intramolecular.

[Claim 7] The organic light emitting device according to claim 6 characterized by using said polymerization film for a hole injection layer, an electron hole transporting bed, or a luminous layer.

[Claim 8] The organic light emitting device according to claim 6 or 7 characterized by said polymerization nature double bond consisting of a double bond of carbon-carbon.

[Claim 9] The organic light emitting device according to claim 8 characterized by the double bond of said carbon-carbon consisting of an acrylic ester radical which is not permuted [the vinyl group which is not permuted / a permutation or /, a permutation, or].

[Claim 10] The organic light emitting device according to claim 6 to 9 characterized by having said at least three or more polymerization nature double bond radicals.

[Claim 11] The manufacture approach of the organic light emitting device characterized by being the manufacture approach of an organic light emitting device according to claim 6 to 10, dissolving said thoria reel amine compound in a solvent, forming membranes by the applying method, and forming the polymerization film with light, heat, or an electron ray.

[Claim 12] The manufacture approach of the organic light emitting device characterized by being the manufacture approach of an organic light emitting device according to claim 6 to 10, dissolving said thoria reel amine compound in a solvent, forming a pixel by print processes, and considering as the polymerization film with light, heat, or an electron ray.

[Claim 13] The manufacture approach of the organic light emitting device characterized by being the manufacture approach of an organic light emitting device according to claim 6 to 10, dissolving said thoria reel amine compound in a solvent, forming a pixel by the ink jet printing method, and considering

as the polymerization film with light, heat, or an electron ray.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the component which emits light by impressing electric field to the thin film which especially becomes a thoria reel amine compound and a list from an organic compound about the polymerization film which used this thoria reel amine compound, an organic light emitting device, and its manufacture approach.

[0002]

[Description of the Prior Art] An organic light emitting device is a component using the light emitted in case the exciton of a fluorescence compound is made to generate and this exciton returns to a ground state by making the thin film containing a fluorescence organic compound ****, and pouring in an electron and a hole (electron hole) from each electrode between an anode plate and cathode.

[0003] About two 1000 cd/m luminescence is reported by the component of the functional discrete-type two-layer configuration which used ITO for the anode plate, used the alloy of magnesium silver for cathode in research (Appl.Phys.Lett.51,913 (1987)) of KODAKKU in 1987, respectively, and used the triphenylamine derivative for the hole transport ingredient, using an aluminum quinolinol complex as an electronic transport ingredient and a luminescent material in about [10V] applied voltage. As a patent of relation, a U.S. Pat. No. 4,539,507 number, U.S. Pat. No. 4,720,432, a U.S. Pat. No. 4,885,211 number, etc. are mentioned.

[0004] Moreover, by changing the class of fluorescence organic compound, luminescence from ultraviolet to infrared rays is possible, and, recently, research of various compounds is done actively. For example, it is indicated by a U.S. Pat. No. 5,151,629 number, a U.S. Pat. No. 5,409,783 number, U.S. Pat. No. 5,382, No. 4 or 77, JP,2-247278,A, JP,3-255190,A, JP,5-202356,A, JP,9-202878,A, JP,9-227576,A, etc.

[0005] Furthermore, the organic light emitting device which used the conjugated-system giant molecule other than an organic light emitting device using the above low-molecular ingredients is reported by the group (Nature, 347,539 (1990)) of Cambridge University. By this report, luminescence is checked by the monolayer by forming polyphenylene vinylene (PPV) by the coating system. As a related patent of the organic light emitting device using a conjugated-system macromolecule, a U.S. Pat. No. 5,247,190 number, a U.S. Pat. No. 5,514,878 number, a U.S. Pat. No. 5,672,678 number, JP,4-145192,A, JP,5-247460,A, etc. are mentioned.

[0006] Thus, the latest advance in an organic light emitting device is remarkable, and the description has suggested the possibility from the versatility of high brightness and luminescence wavelength, high-speed responsibility, a thin shape, and the lightweight formation of a luminescence device being possible to an extensive application with low applied voltage.

[0007] However, the optical output or high conversion efficiency of the further high brightness is required of the actual condition. Moreover, there are still many problems in respect of endurance, such as degradation by an ambient atmosphere gas, moisture, etc. containing aging and oxygen by activity of long duration. Although luminescence of blue with the sufficient color purity at the time of furthermore

considering the application to a full color display etc., green, and red is needed, it is not fully solved yet about this problem.

[0008] moreover -- as the example which used the polymerization film for the organic light emitting device -- the collection of the 59th Japan Society of Applied Physics scientific lecture meeting drafts -- No.31090 (1998) and the collection of the 46th applied-physics relation union lecture meeting drafts -- although No.31257 (1999) etc. are mentioned, these are vacuum evaporation polymerization systems and a problem remains in respect of control of a polymerization, productivity, etc.

[0009]

[Problem(s) to be Solved by the Invention] This invention is made in order to solve the trouble of such a conventional technique, is very efficient and is to offer the organic light emitting device which has the optical output of high brightness and a high life. Moreover, while versatility is in luminescence wavelength and presenting various luminescent color phases, it is in offering an extremely durable organic light emitting device. It is in offering the organic light emitting device which manufacture can furthermore create cheaply easily.

[0010]

[Means for Solving the Problem] this invention person etc. came to complete this invention, as a result of inquiring wholeheartedly, in order to solve an above-mentioned technical problem.

[0011] That is, the thoria reel amine compound of this invention is characterized by having two or more polymerization nature double bonds at least in the same intramolecular.

[0012] In the thoria reel amine compound of this invention, it is desirable that said polymerization nature double bond has preferably the double bond of carbon-carbon, to consist of an acrylic ester radical which is not permuted [the vinyl group which is not permuted / a permutation or /, a permutation, or], and said at least three or more polymerization nature double bond radicals.

[0013] Moreover, the polymerization film of this invention is characterized by containing said thoria reel amine compound.

[0014] Moreover, in the organic light emitting device which has at least the layer which consists of an electrode of a couple with which the organic light emitting device of this invention consists of an anode plate and cathode, and 1 or two or more organic compounds with which inter-electrode [of this couple] ****(ed), it is characterized by at least one layer of the layers containing said organic compound changing from the polymerization film containing the thoria reel amine compound which has two or more polymerization nature double bonds at least to the same intramolecular.

[0015] In the organic light emitting device of this invention, it is desirable that said polymerization film's being used for a hole injection layer, an electron hole transporting bed, or a luminous layer and said polymerization nature double bond have preferably the double bond of carbon-carbon, to consist of an acrylic ester radical which is not permuted [the vinyl group which is not permuted / a permutation or /, a permutation, or], and said at least three or more polymerization nature double bond radicals.

[0016] Furthermore, it is characterized by being the manufacture approach of said organic light emitting device, dissolving said thoria reel amine compound in a solvent, forming membranes by the applying method, and forming the polymerization film with light, heat, or an electron ray the first of the manufacture approach of the organic light emitting device of this invention.

[0017] The second of the manufacture approach of the organic light emitting device of this invention is the manufacture approach of said organic light emitting device, it dissolves said thoria reel amine compound in a solvent, forms a pixel by print processes, and is characterized by considering as the polymerization film with light, heat, or an electron ray.

[0018] The third of the manufacture approach of the organic light emitting device of this invention is the manufacture approach of said organic light emitting device, it dissolves said thoria reel amine compound in a solvent, forms a pixel by the ink jet printing method, and is characterized by considering as the polymerization film with light, heat, or an electron ray.

[0019] In this invention, two or more polymerization nature double bonds are given to the organic compound itself which has charge transportability or a luminescence, and membranes are formed in the state of a single molecule or oligomer, in order to promote membrane formation postpolymerisation and

to form the hardening polymerization film, condensation of organic compounds, crystallization, etc. do not take place, but it is very stable and the organic light emitting device excellent in endurance can be offered.

[0020]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail.

[0021] The thoria reel amine compound of this invention has two or more three or more polymerization nature double bonds at least preferably in the same intramolecular.

[0022] As a concrete example of the thoria reel amine which makes the frame of the thoria reel amine compound of this invention A triphenylamine, 4, 4', a 4''-tris (4-biphenyl) amine, 4, 4', 4''-tris (4-terphenyl) amine, N, and N-diphenyl-1-naphthylamine, An N and N-JI (4-biphenyl)-1-naphthylamine, N, and N-diphenyl-1-pyrenyl amine, The tertiary amine permuted by aromatic hydrocarbon rings, such as N and N-JI (1-naphthyl) aniline, N, and N 1 JI (4-biphenyl) aniline, N, and N-JI (2-pyridyl) aniline, and the aromatic heterocycle is mentioned. These aromatic hydrocarbon rings can have a substituent.

[0023] Moreover, as a concrete example of a polymerization nature double bond, vinyl, an allyl compound, isopropenyl, 1, 3-swine dienyl, a bitter taste roil, a meta-bitter taste roil, etc. may be mentioned, and any which are not permuted [a permutation and] are sufficient as these. Also among these, the acrylic ester radical which is not permuted [the vinyl group which is not permuted / a permutation or /, a permutation, or] is desirable. This polymerization nature double bond is indirectly permuted by the tertiary amine permuted by the aromatic hydrocarbon ring described previously and the aromatic heterocycle through direct or aliphatic hydrocarbon, an oxygen atom, etc.

[0024] The above example is to the last the most typical, and, of course, is not limited to these.

[0025] Next, the polymerization film of this invention is explained.

[0026] The polymerization film of this invention contains the thoria reel amine compound of this invention. The compound polymerization film which comes to carry out the polymerization of the thoria reel amine compound of this invention which made other compounds, such as homopolymerization film which comes to carry out the polymerization of the thoria reel amine compound of this invention, a hole transportability compound, a luminescent compound, and an electronic transportability compound, specifically contain is mentioned.

[0027] Next, the organic light emitting device of this invention is explained.

[0028] In the organic light emitting device of this invention, at least one layer of the layers containing an organic compound changes from the polymerization film containing the thoria reel amine compound which has two or more polymerization nature double bond radicals at least to the same intramolecular. The layer containing other organic compounds is formed between an anode plate and cathode by the sol gel process and the vacuum deposition method, or the solution applying method. The thickness of the organic layer is thinner than 10 micrometers, and it is preferably desirable to thin-film-ize in thickness of 0.05-0.5 micrometers more preferably 0.5 micrometers or less.

[0029] Below, along with a drawing, this invention is explained further at a detail.

[0030] Drawing 1 is the sectional view showing an example of the organic light emitting device of this invention. Drawing 1 is the thing of a configuration of having formed an anode plate 2, a luminous layer 3, and cathode 4 one by one on the substrate. The light emitting device used here is useful, when it is single and has hole transport ability, electron transport ability, and the luminescent engine performance by itself, or when mixing and using the compound which has each property.

[0031] Drawing 2 is the sectional view showing other examples in the organic light emitting device of this invention. Drawing 2 is the thing of a configuration of having formed an anode plate 2, the hole transporting bed 5, the electronic transporting bed 6, and cathode 4 one by one on the substrate 1. in this case, photogene -- hole transportability -- or any of electronic transportability -- or it is useful, when using for each layer the ingredient which has both functions and using combining the mere hole transport matter or the electronic transport matter without the luminescence. Moreover, a luminous layer 3 consists in this case of either the hole transporting bed 5 or the electronic transporting bed 6.

[0032] Drawing 3 is the sectional view showing other examples in the organic light emitting device of this invention. Drawing 3 is the thing of a configuration of having formed an anode plate 2, the hole

transporting bed 5, a luminous layer 3, the electronic transporting bed 6, and cathode 4 one by one on the substrate 1. Since the various compounds which differ in luminescence wavelength can be used while this separating the function of carrier transport and luminescence, and combining it hole transportability, electronic transportability, a compound with each luminescent property, and timely, using it and its degree of freedom of ingredient selection increasing extremely, diversification of a luminescent color phase is attained. Furthermore, it also becomes possible to confine each carrier or an exciton in a central luminous layer effectively, and to aim at improvement in luminous efficiency.

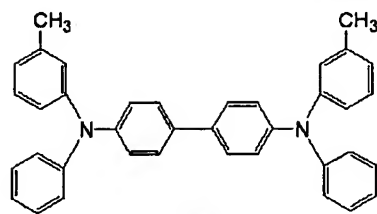
[0033] However, drawing 1 -3 are a to the last very fundamental component configuration, and the configuration of the organic light emitting device of this invention is not limited to these. For example, various lamination -- the hole transporting bed which prepares the glue line or interference layer which prepares an insulating layer in an electrode and an organic layer interface consists of two-layer [from which ionization potential differs] -- can be taken.

[0034] the layer which consists of the polymerization film containing the above-mentioned thoria reel amine compound in this invention -- a hole impregnation transporting bed, an electronic transporting bed, and a luminous layer, although it is applicable to all the hole transportability compounds (for example, compound shown in ** 1-2) which the need responds and are known until, or luminescent compounds (for example, compound shown in ** 3) -- electronic transportability compounds (for example, compound shown in ** 4-6) can also be used together again if needed.

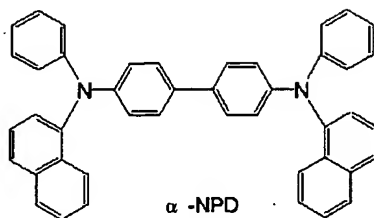
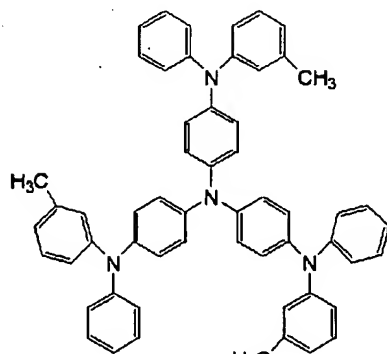
[0035]

[Formula 1]

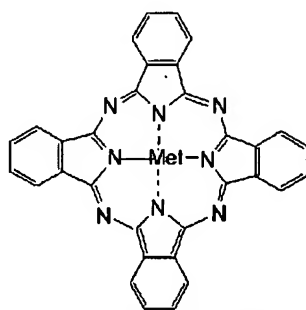
ホール輸送性材料 (低分子系)



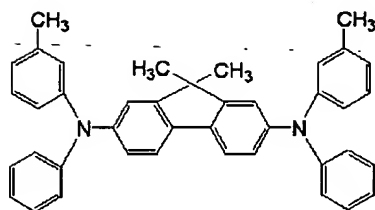
TPD

 α -NPD

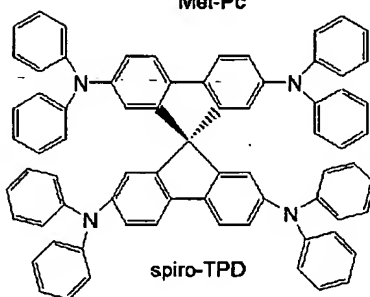
m-MTDATA

Met: Cu, Mg, AlCl, TiO₂, SiCl₂ etc

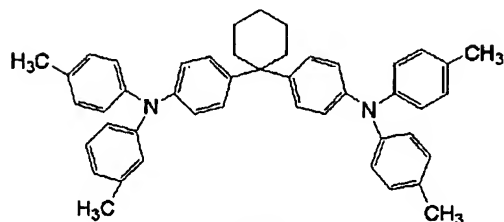
Met-Pc



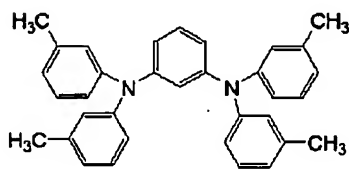
DTDPFL



spiro-TPD



TPAC

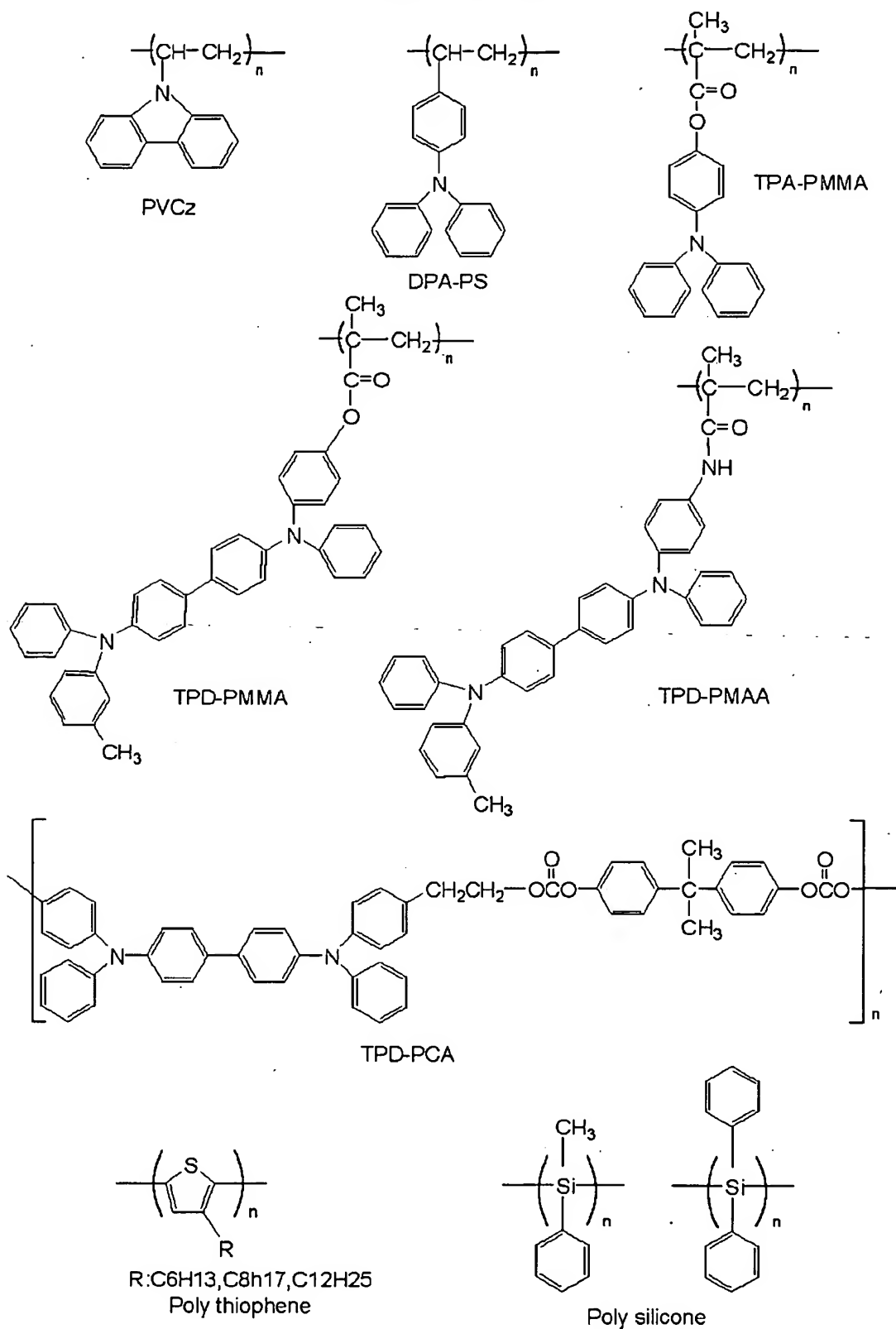


PDA

[0036]

[Formula 2]

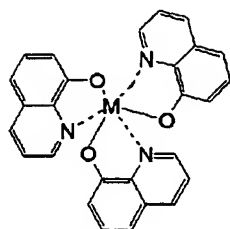
ホール輸送性材料（高分子系）



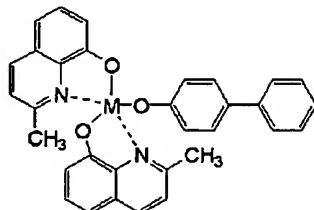
[0037]

[Formula 3]

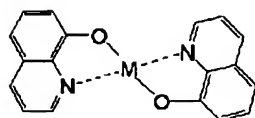
電子輸送性（発光）材料



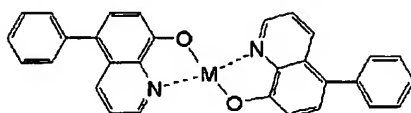
M:Al,Ga



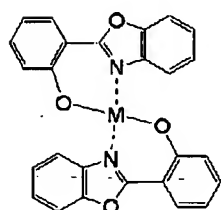
M:Al,Ga



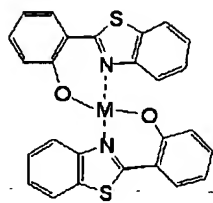
M:Zn,Mg,Be



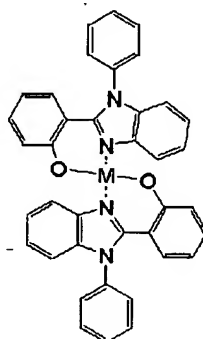
M:Zn,Mg,Be



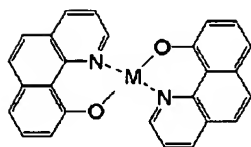
M:Zn,Mg,Be



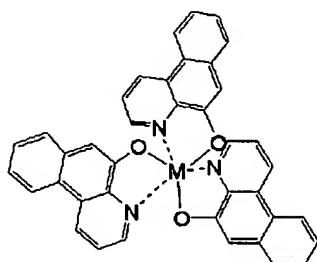
M:Zn,Mg,Be



M:Zn,Mg,Be



M:Zn,Mg,Be

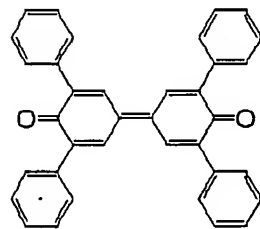
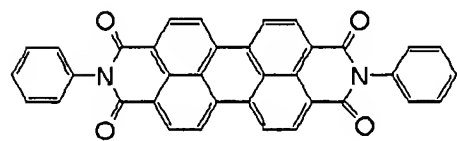
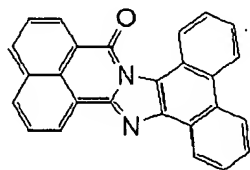
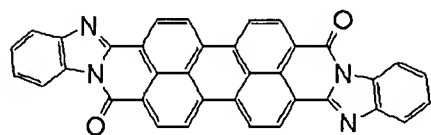
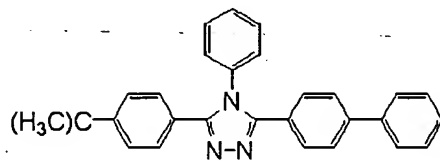
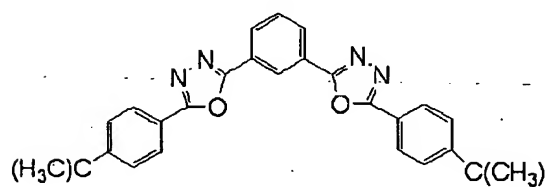
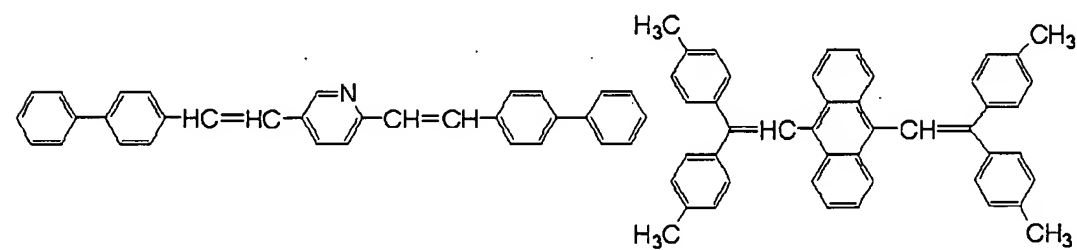
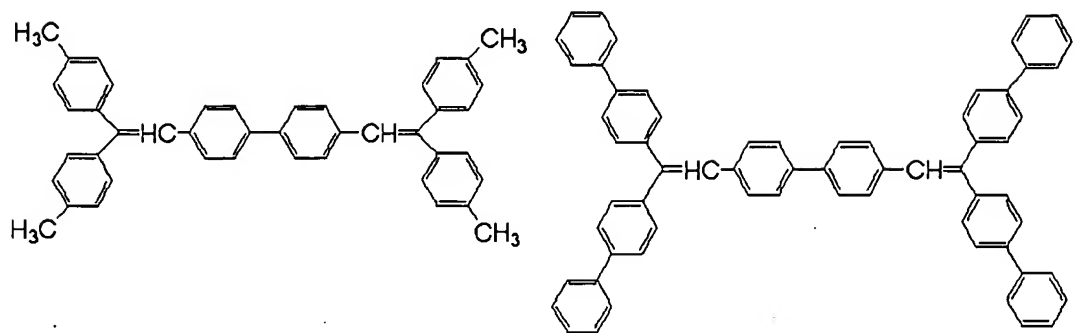


M:Al,Ga

[0038]

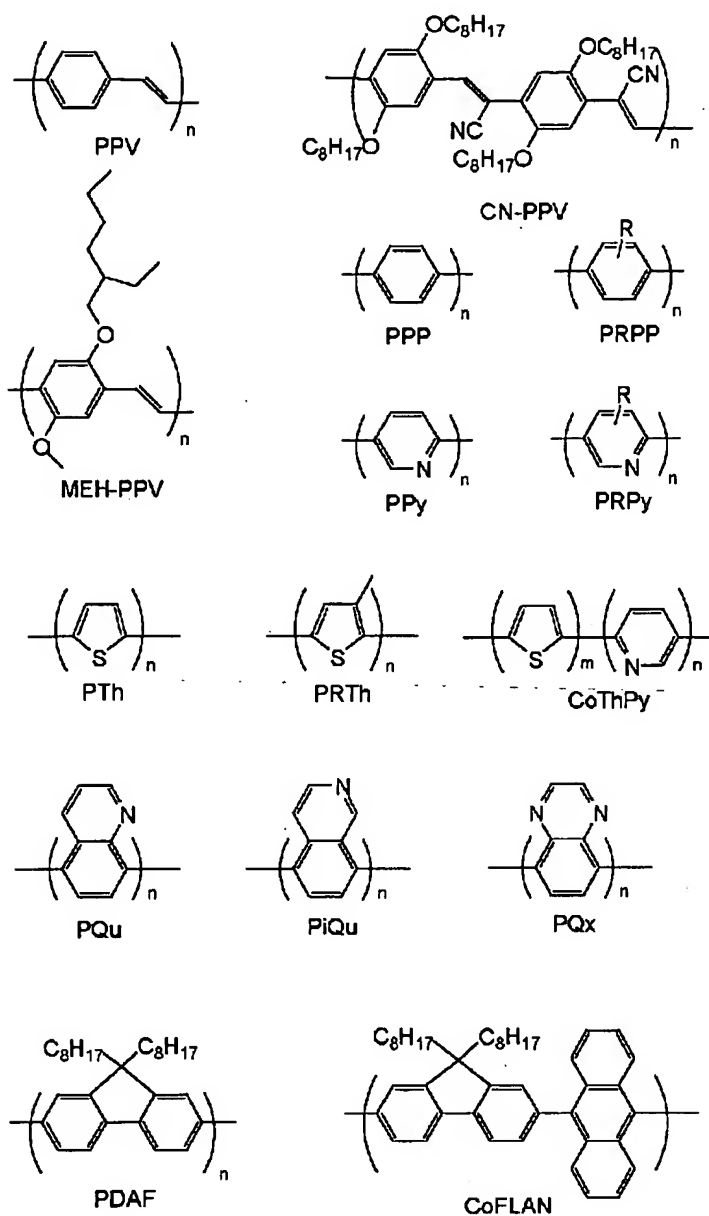
[Formula 4]

電子輸送性（発光）材料



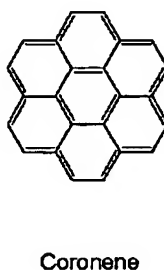
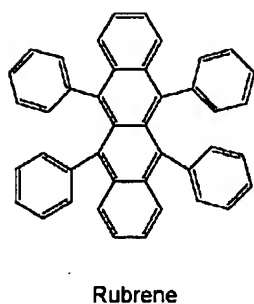
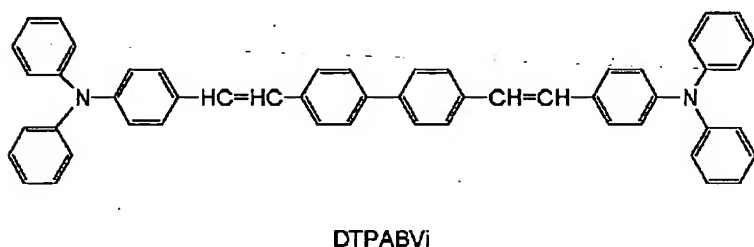
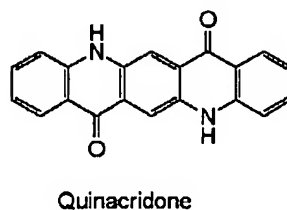
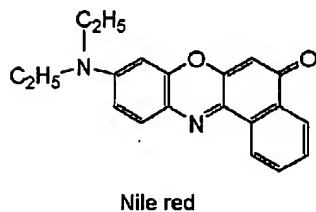
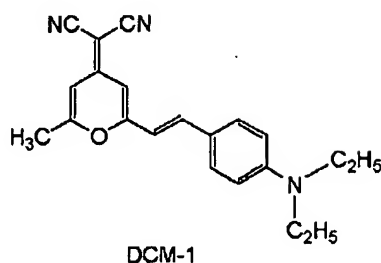
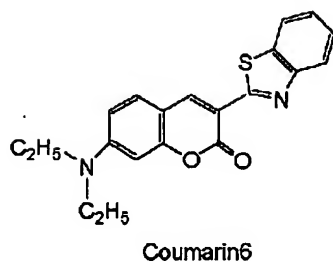
[0039]
[Formula 5]

高分子系発光材料



[0040]
[Formula 6]

ドーパント材料



[0041] Although not limited, especially the formation approach of the layer which consists of the polymerization film containing the above-mentioned thoria reel amine compound dissolves the thoria reel amine compound of this invention in a solvent, by the applying method, print processes, or the ink jet printing method, forms membrane formation or a pixel and can be formed by carrying out a polymerization with light, heat, or an electron ray.

[0042] In the organic light emitting device of this invention, generally, it is made to dissolve in a vacuum deposition method or a suitable solvent, and the layer which consists of organic compounds other than the layer which consists of the polymerization film containing the above-mentioned thoria reel amine compound forms a thin film by the applying method. When forming membranes especially by the applying method, the film can also be formed combining suitable binding resin.

[0043] Although it can choose from bending resin wide range as the above-mentioned binding resin, for example, polyvinyl-carbazole resin, polycarbonate resin, polyester resin, polyarylate resin, polystyrene resin, acrylic resin, methacrylic resin, butyral resin, polyvinyl-acetal resin, diallyl phthalate resin, phenol resin, an epoxy resin, silicone resin, polysulfone resin, a urea-resin, etc. are mentioned, it is not limited

to these. moreover -- as that these are independent or a copolymer polymer -- one sort -- or two or more sorts may be mixed.

[0044] What has as big a work function as an anode material as possible is good, for example, metallic oxides, such as metal simple substances, such as gold, platinum, nickel, palladium, cobalt, a selenium, and vanadium, or these alloys, tin oxide, a zinc oxide, a tin oxide indium (ITO), and a zinc oxide indium, can be used. Moreover, conductive polymers, such as the poly aniline, polypyrrole, the poly thiophene, and a polyphenylene sulfide, can also be used. Such electrode material may be used independently and can also be used together. [two or more]

[0045] On the other hand, as a cathode material, the small thing of a work function is good and can use as a metal simple substance or two or more alloys, such as a lithium, sodium, a potassium, calcium, magnesium, aluminum, an indium, silver, lead, tin, and chromium. Utilization of metal oxidation, such as a tin oxide indium (ITO), is also possible. Moreover, a configuration is much more sufficient as cathode, and it can also take a multilayer configuration.

[0046] Especially as a substrate used by this invention, although it does not limit, transparency substrates, such as opaque substrates, such as a metal substrate and a substrate made from the ceramics, glass, a quartz, and a plastic sheet, are used. Moreover, it is also possible to use the light filter film, the fluorescence color conversion filter film, the dielectric reflective film, etc. for a substrate, and to control coloring light.

[0047] In addition, to the created component, a protective layer or a closure layer can also be prepared in order to prevent contact with oxygen, moisture, etc. As a protective layer, a photo-setting resin etc. is mentioned to poly membrane pans, such as inorganic material film, such as a diamond thin film, a metallic oxide, and a metal nitride, fluorine resin, poly paraxylene, polyethylene, silicone resin, and polystyrene resin. Moreover, glass, a gas impermeable film, a metal, etc. can be covered and packaging of the component itself can also be carried out with suitable closure resin.

[0048]

[Example] Hereafter, although the example explains this invention still more concretely, this invention is not limited to these.

[0049] [Example 1]

DMF600g was taught to <composition of 4, 4', and 4''-TORIBI nil triphenylamine> 3l. 3

TSUROFURASUKO, and cooling churning was carried out in the iced water bath. It was dropped keeping 1256g of phosphorus oxychloride at 10 degrees C or less, and churning was continued for after [dropping termination] 15 minutes. Next, DMF250ml was made to carry out suspension distribution of the triphenylamine 50g (0.204 mols), and it poured into the churning liquid prepared previously. Temperature up of the reaction temperature was carried out gradually, and heating churning was continued at 80 degrees C for 100 hours. What dissolved 4000g of sodium acetate in 40l. of water was prepared, previous reaction mixture was poured into this, and the crystal was deposited. After filtering a crystal, it rinsed 3 times by making it dissolve in toluene. By carrying out vacuum concentration of the toluene and adding a hexane, the crystal was deposited and 4, 4', and 55.2g of rough crystals of a 4''-TORIHORU mill triphenylamine were obtained by filtering and drying. 4, 4', and a 4''-TORIHORU mill triphenylamine refined material and 16.5g of greenish yellow crystals were obtained by refining the obtained rough crystal using a silica gel column.

[0050] DMF200ml was taught to 500ml 4 TSUROFURASUKO, and it cooled to 5 degrees C or less in the iced water bath. Sodium-methoxide 18.4g was added in this liquid, 73.0g was further added for the triphenyl phosphine methyl bromide, and churning was continued for 30 minutes. Next, 4, 4', and the thing that dissolved 4''-TORIHORU mill triphenylamine 15.0g in DMF200ml were dropped over 1 hour, keeping dropping temperature at 10 degrees C or less. Furthermore, it continued at 30 degrees C and heating churning was continued at 60 degrees C for 4 hours for 2 hours. The obtained reaction mixture was diluted with 500ml of water, a toluene extract and rinsing were repeated 3 times, and 4, 4', and 12.5g of rough crystals of a 4''-TORIBI nil triphenylamine were obtained by carrying out vacuum concentration of the toluene. 4 of the specified substance, 4', and a 4''-TORIBI nil triphenylamine refined material and 8.9g of white needle crystal were obtained by refining the obtained rough crystal

using a silica gel column. The infrared absorption spectrum of this compound is shown in drawing 4.
[0051] [Example 2]

What formed the tin oxide indium (ITO) by 120nm thickness in the spatter was used as a transparent conductive support substrate 1 on the <creation of component shown in drawing 2> glass substrate. Sequential ultrasonic cleaning of this was carried out by the acetone and isopropyl alcohol (IPA), and boiling washing and desiccation were carried out by IPA. Furthermore, what carried out UV / ozone washing was used as a transparent conductive support substrate.

[0052] 4, 4', and 4''-TORIBI nil triphenylamine 0.10g were dissolved in toluene 5.0g, and ***** was adjusted. After forming membranes with the spin coat method (2000rpm) on the transparency support substrate and irradiating ultraviolet rays for 3 minutes using this ***** , under nitrogen-gas-atmosphere mind, it performed at 80 degrees C for 10 minutes, heat treatment was performed at 120 degrees C for 2 hours, and the triphenylamine polymerization film of 55nm thickness was created.

[0053] Furthermore, electronic transport-cum-the luminous layer of 50nm of thickness was formed for aluminum quinolinol (Aq13) with the vacuum deposition method. The degree of vacuum at the time of vacuum evaporationo formed 1.0×10 to 4 Pa, and a membrane formation rate on condition that 0.3 nm/sec.

[0054] Next, using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), the metal layer membrane with a thickness of 200nm was formed with the vacuum deposition method on the organic layer like the point, and the component of the structure shown in drawing 2 was created. The degree of vacuum at the time of vacuum evaporationo formed 1.0×10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.

[0055] Thus, when the ITO electrode was used the obtained component, the positive electrode and the aluminum-Li electrode were used as the negative electrode and the direct current voltage of 7V was impressed, the current flowed with the current density of 5.3 mA/cm², and green luminescence of initial brightness 230 cd/m² was observed.

[0056] [Example 3]

What formed the tin oxide indium (ITO) by 120nm thickness in the spatter was used as a transparent conductive support substrate on the <creation of component shown in drawing 1> glass substrate. Sequential ultrasonic cleaning of this was carried out by the acetone and isopropyl alcohol (IPA), and boiling washing and desiccation were carried out by IPA. Furthermore, what carried out UV / ozone washing was used as a transparent conductive support substrate.

[0057] 4, 4', 4''-TORIBI nil triphenylamine 0.10g, and CN-PPV0.050g were dissolved in xylene 10ml, and ***** was adjusted. Using this ***** , membranes were formed with the spin coat method (2000rpm) on the transparency support substrate, and under nitrogen-gas-atmosphere mind, it performed at 80 degrees C for 1 hour, heat treatment was performed at 120 degrees C for 2 hours, and the triphenylamine polymer of 110nm thickness and the bipolar membrane of CN-PPV were created.

[0058] Next, using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the organic layer like the point, and the component of the structure shown in drawing 1 was created. The degree of vacuum at the time of vacuum evaporationo formed 1.0×10 to 4 Pa, and a membrane formation rate on condition that 1, 0 - 1.2 nm/sec.

[0059] Thus, when the ITO electrode was used the obtained component, the positive electrode and the aluminum-Li electrode were used as the negative electrode and the direct current voltage of 11V was impressed, the current flowed with the current density of 21.8 mA/cm², and blue luminescence of initial brightness 170 cd/m² was observed.

[0060] [Example 4]

What formed the tin oxide indium (ITO) by 120nm thickness in the spatter was used as a transparent conductive support substrate on the <creation of component shown in drawing 3> glass substrate. Sequential ultrasonic cleaning of this was carried out by the acetone and isopropyl alcohol (IPA), and boiling washing and desiccation were carried out by IPA. Furthermore, what carried out UV / ozone washing was used as a transparent conductive support substrate.

[0061] 4, 4', and 4''-TORIBI nil triphenylamine 0.10g were dissolved in toluene 5.0g, and ***** was adjusted. After forming membranes with the spin coat method (2000rpm) on the transparence support substrate and irradiating ultraviolet rays for 3 minutes using this ***** , under nitrogen-gas-atmosphere mind, it performed at 80 degrees C for 10 minutes, heat treatment was performed at 120 degrees C for 2 hours, and the triphenylamine polymerization film of 55nm thickness was created. Besides, the coumarin 6 (1.0wt%) and the coevaporation membrane of aluminum quinolinol were formed by 200nm thickness, and aluminum NOUMU quinolinol was further formed by 300nm thickness with vacuum deposition.

[0062] Next, using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), the metal layer membrane with a thickness of 200nm was formed with the vacuum deposition method on the organic layer like the point, and the component of the structure shown in drawing 3 was created. The degree of vacuum at the time of vacuum evaporationo formed 1.0×10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 mn/sec.

[0063] Thus, when the ITO electrode was used the obtained component, the positive electrode and the aluminum-Li electrode were used as the negative electrode and the direct current voltage of 8V was impressed, the current flowed with the current density of 5.1 mA/cm², and green luminescence of initial brightness 370 cd/m² was observed.

[0064] Moreover, when this component was maintained at current density 3.0 mA/cm² in 80 degrees C under nitrogen-gas-atmosphere mind and the electrical potential difference was impressed for 1000 hours, there were dramatically little 1000 hours after [initial brightness 200 cd/m²] brightness 175 cd/m² and brightness degradation.

[0065]

[Effect of the Invention] as the organic light emitting device using the polymerization film of the thoria reel amine of this invention being shown from an example -- low applied voltage -- high -- brightness luminescence is obtained and it excels also in endurance. Furthermore, of course, creation of a component can also be created using the applying method, print processes, and the ink jet printing method, vacuum deposition or its casting method is comparatively cheap, and the component of a large area can be created easily.

[Translation done.]